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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,346	09/22/2003	Yujin Yamazaki	826.1895	7037

21171 7590 12/22/2005

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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/665,346	YAMAZAKI ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/20/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **October 11, 2005** has been entered.

2. This Office Action is also in response to applicant's amendment filed on October 11, 2005, which has been entered into the file.

3. By this amendment, the applicant has amended claims 1, 14 and 15.

4. Claims 1-5 and 7-15 remain pending in this application.

5. The rejections to claims under 35 USC 112, first paragraph, with regard to newly added matters are withdrawn in response to applicant's amendment.

6. The *objection* to the phrase "a multi-layer film" is withdrawn by applicant's response, which specially refers this phrase to "a structure comprising layers of respectively different refractive index materials" (remark, page 5 filed on October 11, 2005). The "multi-layer film" here is referred to a *plural of layers* and it will be examined in this respect.

Claim Objections

7. **Claims 1-14 are objected to because of the following informalities:**

(1) Claims 1, 14 and 15 recite the phrase "substrate is fixed via the *first surface* to a fixing material" and the claims also recites the phrase "a first multi-layer film formed on the *first* surface of the substrate" that is confusing and indefinite since it is not clear what is the structural relationship between

the fixing material and the first multi-layer film. It is not clear how can these two materials be formed on the same surface of the substrate. Also it is not clear what is the ***logical*** relationship between the fixing material and the optical device to define an operable and definite optical system. The fixing material can only be broadly interpreted as one can **arbitrarily** adhered the optical device to any other element. It is really not clear what if this is what the scope of the claims.

Appropriate corrections are required.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims, 1, 5 and 7-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Shirasaki (PN. 5,930,045) in view of the patents issued to Spiller et al (PN. 6134,049), and Okumura et al (PN. 5,969,902).**

Shirasaki teaches a *virtual imaged phased array* (VIPA) that is comprised of a *substrate* (164, Figures 12(A)) and *a first reflecting film* (166) placed on a *first surface* of the substrate and *a second reflecting film* (168) placed on a *second surface* of the substrate. The two reflecting films each comprises at least one layer and implicitly has a first and second refractive index. This reference however does not teach *explicitly* that the first and second reflecting films of multi-layer film structure with plural films. However it is a rather standard knowledge in the art that reflective film can be formed by multi-layer structure with alternatively laminated high and low refractive index materials, (please see the explicitly demonstration of **Spiller** et al wherein the reflecting layer has multi-layer structure of alternatively arranged high and low refractive index materials, Figure 1). Such modification would then have been

obvious to one skilled in the art for the benefit of using the multi-layer structure to design reflective layers having desired reflection characteristics.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the VIPA has a *stress correction film* formed *on* the *second multi-layer film*, (with regard to newly amended claims 1, 14 and 15). **Spiller et al** in the same field of endeavor teaches to compensate or reduce stress of a multi-layer film by placing on *top* the multi-layer film a film (13, Figure 1) having a stress value that would balance the stress value of the multi-layer film (12) so that a *net stress* may assume value zero, (please see Figures 1 and 2). It would then have been obvious to apply the teachings of **Spiller et al** to add a stress correction layer on top of the multi-layer film of the VIPA for the benefit of reducing the possible damages or distortion to the substrate of the VIPA induced by the stress of the reflecting films and by the expansion of the substrate under high heat environment. Although these references do not teach explicitly that the stress correction film is provided to correct the stress imposed by both reflecting films on the both sides of the substrate, such feature is implicitly included since for the VIPA having the pair of reflecting films, the stress is contributed from both reflecting films and the stress value of the correction film must be selected to compensate the net stress value contributed from both reflecting films.

With regard to claim 5, Shirasaki teaches that the VIPA (240, Figures 17-20) may be utilized with a mirror (254) to realize a dispersion compensator.

With regard to the feature concerning the substrate is fixed to a fixing layer having the same thermal expansion coefficient as the substrate, it is not clear what is the logical relationship between the fixing material and the substrate and the optical device it therefore can only be examined in the broadest interpretation. It is implicitly true that the VIPA of Shirasaki must be held by a holder in order for it to be positioned and utilized in an optical system such as shown in Figures 13 and 17-19. This means the VIPA is *fixed* to certain *fixing material* such as a *holder*. It is well known in the art that in a high

temperature environment, materials of different thermal expansion coefficient will expand or contract differently, which may cause distortion. It would then have been obvious to one skilled in the art to make the holder of the VIPA having the same thermal expansion coefficient as the substrate of VIPA, as explicitly taught by **Okumura** et al to make the disk substrate *support member* and the disk *substrate* with the materials having the *same* thermal expansion coefficient, to prevent distortion to the substrate when held by the support member or the holder for the benefit of eliminating distortion and errors in the substrate and therefore the VIPA filter. .

With regard to claims 7-13, although these references do not teach that the holder or the fixing material is made of the various materials claimed, such modifications would have been obvious to one skilled in the art to select desired materials having the same thermal expansion coefficient as the holder for the VIPA for the benefit of using a variety of alternative materials as the materials for making the holder that fixes the substrate of the VIPA and at the same time not cause distortion to the substrate. The fixing to the protector plate may be considered as optically jointed.

10. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Shirasaki (PN. 5,930,045) in view of the patents issued to Fujii et al (PN. 5,424,876) and Okumura et al (PN. 5,969,902).

Shirasaki teaches a *virtual imaged phased array* (VIPA) that is comprised of a *substrate* (164, Figures 12(A)) and *a first reflecting film* (166) placed on a *first surface* of the substrate and *a second reflecting film* (168) placed on a *second surface* of the substrate. The two reflecting films each comprises at least one layer and implicitly has a first and second refractive index. This reference however does not teach *explicitly* that the first and second reflecting films of multi-layer film structure with plural films. However it is a rather standard knowledge in the art that reflective film can be formed by multi-layer structure with plural layers of different refractive index materials. **Fujii** in the same field of endeavor

teaches a reflective film that is comprised of plural layers of different refractive index. It would then have been obvious to one skilled in the art to modify the reflective layer of Shirasaki et al with plural layers of different refractive index materials for the benefit of using the multi-layer structure to design reflective layers having desired reflection characteristics.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the VIPA has a *stress correction film* formed *on* the second multi-layer film. **Fujii** in the same field of endeavor teaches to use a *silicon dioxide layer* in a *multi-layer mirror* such that the silicon dioxide layer imposes a compressive stress on the substrate of the multi-layer mirror such that the stress on the substrate resulted from all the other multi-layer films in the mirror may be reduced, (please see column 2, lines 1-49). It would then have been obvious to apply the teachings of **Fujii** to add a silicon dioxide layer to the VIPA as a stress correction layer for the benefit of reducing the possible damages or distortion to the substrate of the VIPA induced by the stress of the reflecting films and by the expansion of the substrate under high heat environment. Although these references do not teach explicitly that the stress correction film (i.e. the silicon dioxide film) is provided to correct the stress imposed by both reflecting films on the both sides of the substrate. Such modification would have been obvious to one skilled in the art since the thickness of the silicon dioxide as Fujii teaches explicitly (please see column 4, lines 3-8), is selected particularly to correct and compensate the *net stress* upon the substrate whether the stress is from one film on one side or films on the both sides. The stress on the substrate is a resultant *net stress* on the substrate and that resultant stress is being corrected by the silicon dioxide layer with selected thickness. With regard to claims 2-4, Fujii teaches that the stress correction film is a silicon dioxide film and its thickness may be adjusted to properly reduce the stress. The thickness of the silicon dioxide film is also selected so that it *does not affect* the optical property of the multi-layer mirror. It is a well-known knowledge in the art that in a multi-layer film structure, in order for the layer not to effect the optical property the layer should have an optical thickness of half or multiple of half of the specific wavelength

of interested in order for the light effected by the layer be completely out of phase. Such modification therefore is considered obvious to one skilled in the art so that the silicon dioxide layer will not affect the reflectivity of the reflective layers (166 or 168). The optical flatness of the substrate being within one wavelength or less is rather standard in the art for the purpose of reducing unwanted scattering of the light at the surface.

Although this reference does not teach explicitly that the stress correction layer is placed on the multi-layer film, however since the net stress of the reflecting mirror is the vector sum of the stress contributed by the reflecting multi-layer and the correction film, to place the stress correction film either on the multi-layer film or under does not effect the purpose of reducing the stress. Such modification would then have been obvious to one skilled in the art for the benefit of designing the reflecting mirror as desired and to fit the particular application requirements.

With regard to the feature concerning the substrate being fixed to a fixing layer having the same thermal expansion coefficient as the substrate, it is not clear what is logical relationship between the fixing material and the substrate and the optical device it therefore can only be examined in the broadest interpretation. It is implicitly true that the VIPA of Shirasaki must be held by a holder in order for it to be positioned and utilized in an optical system such as shown in Figures 13 and 17-19. This means the VIPA is *fixed* to certain *fixing material* such as a *holder*. It is well known in the art that in a high temperature environment, materials of different thermal expansion coefficient will expand or contract differently, which may cause distortion. It would then have been obvious to one skilled in the art to make the holder of the VIPA having the same thermal expansion coefficient as the substrate of VIPA, as explicitly taught by **Okumura** et al to make the disk substrate *support member* and the disk *substrate* with the materials having the *same* thermal expansion coefficient, to prevent distortion to the substrate when held by the support member or the holder for the benefit of eliminating distortion and errors in the substrate and therefore the VIPA filter.

Response to Arguments

11. Applicant's arguments with respect to claims 1-5 and 7-15 have been considered but are moot in view of the new ground(s) of rejection.

12. Applicant's arguments are mainly drawn to the newly amended features and newly added claims that they have been fully addressed in the paragraphs above.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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